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Satellites that can run, hide, or duck when under attack

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Run. Blink. Shoot. Hide.

It sounds like a children's game. But it's all part of the deadly serious game of international espionage. At stake is the security of American spy satellites.

The military threat to these invaluable sky spies is mounting rapidly.

This threat has forced American scientists to look for ways to protect US satellites from what appears to be a growing array of Soviet weapons.

Already, the Soviets have antisatellite rockets in place. They could be fired without warning at any time from a range east of the Aral Sea, an inland body of water in the southwest Asiatic USSR. Experts say that in the next few years, the Soviets also may be capable of bringing down US satellites with such exotic devices as lasers, space mines, and new kinetic-energy weapons.

Last week, the United States took a giant leap forward in its own ability to destroy space satellites. A prototype of the US antisatellite missile, or ASAT, scored a bull's-eye as it slammed into an aging US satellite in a test 340 miles over the Pacific Ocean. A US ASAT system should be operational by 1988.

This new threat and counterthreat are aimed at the highly sophisticated satellites that both sides now use for intelligence gathering. The US has about 50 currently in orbit, the Soviets about 100.

As they float in their orbits around Earth, these delicate satellites might appear to be as helpless as a deer in a forest. But experts note that even a deer has its defenses.

It can run. It can hide. And when directly threatened, it can even kick with its sharp hooves.

US scientists are now trying to give American satellites some of these deer-like defenses.

Much of the research in this area is secret. But enough information has been made public by the Pentagon, the Central Intelligence Agency, and other sources to see where things are going.

Among the ideas being explored:

- Satellites that run away. When on-board sensors detect a threat from an enemy warhead, the satellite would be capable of zooming out of reach with on-board rockets.

This tactic has some disadvantages. Any great movement could put the satellite out of the proper

orbit, and cripple its mission. It also forces the satellite to burn fuel, so that its useful life could be shortened.

One possible answer to some of these problems would be refueling satellites from the space shuttle.

- Satellites that hide. Far out in space, at an altitude of more than 70,000 miles, the US could place secret satellites that would be in a "down" mode. Without their instruments functioning, the satellites would be invisible to Soviet infrared sensors.

If other US satellites were destroyed in an attack, these spare satellites could be quickly activated and maneuvered into position closer to the Earth. This would give the US the kind of backup capacity it now lacks.

- Satellites that blink. Blasts of microwaves, lasers, or other electromagnetic forces can blind and damage sensitive equipment on satellites. One answer is to blink — to have rapid shutters that close and protect equipment when sensors indicate an attack.

- Satellites with shields. Attacks with electronic devices, blasts, lasers, and some other forms can be fended off with shields that deflect or block the effects.

For example, a congressional study notes that most US satellites are powered by solar panels, which are vulnerable to shrapnel attack. One defense is to run future satellites with nuclear-powered generators, which can be put inside a specially hardened outer casing.

- Satellites that shoot. At present, when a weapon approaches a satellite, the satellite is helpless to fight back. But defensive weapons could be installed. The US and the USSR are studying such space-based weapons as lasers, particle beams, high-powered radio frequencies, and electronic counter-countermeasures.

- Satellites that deceive. Filling the sky with bogus satellites could fool, or overload, enemy weapons-systems.

None of these defenses is foolproof. As a Pentagon study concludes:

"These defensive measures add to satellite costs, reduce useful payload weights, shorten mission lifetime,

and add to system development and testing complexity; no single defensive measure is totally effective against all threats."

There are two major reasons, however, that the US is researching this area with urgency.

The first is that the US has less flexibility in its satellite-launching capability than the Soviets. US satellites function for long periods of time (years) in space. Soviet satellites are short-lived (weeks or months). This has forced the Soviets to launch satellites on a frequent timetable.

Even if the US swept every crucial Soviet satellite from the skies, the USSR would be back in business in weeks. It would take the US months, or years.

Also, top US intelligence officials have told Congress that the Soviets not only have an ASAT system in place, but they have newer, better ones close at hand.

The Soviet Union has a ground-based laser that could be used now for ASAT, US sources say. And a space-based laser could be tested in the early 1990s, the source adds.